

7.
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ON A

FEW CONTROVERTED POINTS

RESPECTING THE

PHYSIOLOGY OF GENERATION.

By JAMES BLUNDELL, M.D.

LECTURER, IN CONJUNCTION WITH DR. HAIGHTON, ON PHYSIOLOGY
AND MIDWIFERY, AT GUY'S HOSPITAL.

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Read May 25, 1819.

AMONG the various questions which have been raised respecting the generation of animals, there is one, as yet undecided, which has not perhaps been hitherto investigated with all the care it deserves. It may be demonstrated by experiment, that, in this curious process, the male furnishes the semen, and the female the rudiments; but whether these two substances must have access to each other, in order that the young animal may be formed, is a question which still admits of dispute. It is true, indeed, that many naturalists have *asserted*, that contact is necessary; and Spallanzani has even

gone so far as to demonstrate that it certainly takes place in the generation of the frog and toad. Still, however, notwithstanding the labours of physiologists hitherto, we are not, I believe, as yet in possession of any regular system of experiments, which proves that the semen must have access to the rudiments, in those forms of brute generation which most nearly resemble our own. In the present state of our knowledge, the reverse of this position seems, at least, not improbable, as the experiments of Dr. Haighton, a valued relative of mine, have shewn, that evidences of generation may be produced in the ovaries, although the semen has been excluded previously to sexual intercourse by the closure of the fallopian tube.

The principal object of the memoir, which I have now the honour of presenting to the Medico-Chirurgical Society, is to contribute some little towards the supply of this defect. In it I have endeavoured to shew, that the semen must have access to the rudiments, in order that the young animal may be produced; and yet, that generation, although these approaches are necessary for its completion, may, to a certain extent, be accomplished without them.

As the rabbit was the animal, on account of its natural aptitudes, selected for my experiments, it may be proper, perhaps, before I enter on the re-

cital of them, to premise a few remarks on its genital system*. In the fallopian tubes, and ovaries, and, I may add, the *external* genitals of the doe, there is little, when we view the organs as they are suspended in the glass, to attract the attention of the observer. It is different, however, with the vagina and the wombs; these are so strongly contrasted with the corresponding parts of the human organs, the wombs, by their tubular form, and the vagina by its length, its laxity, and large diameter, that they cannot be overlooked.

The vagina, when full grown, is about four inches long, and so capacious that, without much stretching, it will readily admit the extremity of the fore-finger. Its size, indeed, is so considerable, that it makes an approach to that of the human vagina, and greatly exceeds the dimensions of the same canal in a moderate-sized monkey, preserved in the obstetric museum, at Guy's Hospital.

The wombs, the structure of which is scarcely less remarkable than that of the vagina, are two tubular organs, when unimpregnated, about three inches and a half long and about two lines and a half in their diameter; they are therefore, it is obvious, very unlike the human uterus, and rather

* It is scarcely necessary to remark that this description is not addressed to those who have made a study of comparative anatomy.

resemble that of several of our domesticated animals, as the cat, for instance, the bitch, and the females of the rat and mouse tribe. These two wombs, it should be further remarked, communicate with the vagina by two distinct orifices; and they are so completely independent of each other, that the one may be removed without injury to the other, excepting a slight and superficial wound of that part where their necks lie in contact, and cohere.

Both the wombs and the vagina are, in these animals, furnished with longitudinal and annular fibres of a muscular structure, similar in kind to those of the intestines, but grosser and more distinct. In addition to these, along the inner margin of the wombs, from one extremity to the other, there runs a broad strip of fleshy fibres, which may, perhaps, not improperly be denominated the mesometric. I give the muscle this name, because it covers no inconsiderable portion of what may be called the *mesometry**; a delicate double membrane, the production of the peritoneum, which performing, for the tubular wombs, the office of a mesentery, unites them, like the intestines, to the chine. It is allied to the broad ligaments of the human womb.

* I venture on the name with diffidence, but no preferable term occurs to me; its etymology is obvious, and, I believe, legitimate and analogical.

All these fleshy fibres are animated with a very lively irritability. The mesometric muscle* changes the situation of the wombs. The wombs themselves perform a peristaltic action. The vagina not only performs this action, but an additional movement, which I shall hereafter have occasion to describe.

Such are the most striking characteristics of the genital system in the rabbit, those, at least, which the following experiments require me to notice. I may now proceed to the experiments themselves.

The first set of experiments was instituted with a view of ascertaining whether the semen and rudiments must have access to each other, in order that the young animal may be formed. For this purpose, an incision was made into the cavity of the belly, immediately above the wombs; and these, together with the upper part of the vagina, were pushed through the opening. One of the wombs was then divided near its mouth, in a transverse direction, (just as a piece of intestine might be), so as to separate it into two portions, the superior and inferior; or, as they may be designated from the annexed parts, the vaginal and fallopian. After this division the organs were immediately replaced, and the wound was sewed up.

* Is this muscle allied in function to the round ligaments of the human womb?

Notwithstanding this violence, in the course of a few days, or a few weeks at farthest, most of the rabbits recovered their health, and at different intervals became fit for the approaches of the male. But though the general health was restored, the recovery was not complete. The operation, as subsequent dissection proved, had the effect of interrupting the canal of the womb, its tubular cavity growing up at the line of division, so that the communication between the vaginal and fallopian pieces became intercepted, and the semen and the rudiments could have no access to each other.

In this condition of the genitals, as soon as the sexual ardour was rekindled, the animals were submitted to the male; and, excepting in one or two anomalous instances, out of ten or twelve experiments, they all became pregnant from the *first* admissions. At different periods from impregnation the sexual organs were examined after death with great care and deliberation, when young animals were invariably found in the sound womb, but none in the interrupted. This, it is true, like the human uterus in extra-uterine pregnancy, was in many instances enlarged and developed and plentifully supplied with blood, indeed it often appeared as well adapted as its fellow for receiving and cherishing the rudiments; but with all its aptitudes for generation, it lay under one capital defect, its canal was interrupted; it

intercepted the access of the semen to the rudiments, and without this access generation could not be accomplished.

To confirm this conclusion, the accuracy of which I doubted at the time, it was determined to submit it to the test of another train of experiments. In these it was my object, to preserve the principle of the preceding operation, the exclusion of the semen from the rudiments ; and yet at the same time, to vary its circumstances as much as possible, in order to ascertain how far they had affected the result ; for I need not observe, that circumstances often exert a silent and most fallacious influence over our experiments, (our negative experiments especially) to be deprecated the more, because, from its insidious nature, it is so frequently overlooked.

In this second series of experiments, therefore, instead of operating upon rabbits that were full grown, I made use of those only that were under their puberty ; and instead of interrupting, as before, the canal of the *Uterus*, I interrupted that of the *Vagina*.

The vagina of the doe, it has been already observed, is at least three inches in length ; so that although it is interrupted at the uterine extremity, there still remains sufficient room for the male organ. Of this peculiarity I availed myself, in con-

ducting these experiments ; and instead of cutting the uterus, I cut the vagina asunder, (near to the mouth of the womb) so as completely to interrupt its canal. In other respects the experiment was conducted as before.

This operation proved dangerous, much more so than the former ; a number of the rabbits however recovered, and admitted, without repugnance, the approaches of the male. The result was decisive. Although the external genitals of these animals were turgid with blood, and the sexual excitement of some was remarkably lively ; although too, in some of them, intercourse was renewed at intervals of a week or a fortnight, on the whole, as many as twenty or thirty times, not one became pregnant. Desire itself in one or two instances, seemed almost insatiable ; and in the rest, though suspended by coition for a time, in the course of a few hours, or a few days at farthest, it invariably recurred.

The same general appearances were observed on dissection, in them all. The vagina, if the operation had been properly performed, was completely interrupted. In both the ovaries there were *corpora lutea*. In some cases, the wombs appeared to have undergone little change ; in others, they were enlarged, and evolved as completely as in actual pregnancy ; but in no one instance was there the appearance of a single *ovum*, extra-ute-

rine or in the womb. In these, as in the preceding experiments, though in a different manner, the access of the semen to the rudiments had been intercepted, and under these circumstances, notwithstanding repeated commerce with the male, the formation of the young animal could not be accomplished.

In performing the experiments recorded in the preceding paragraphs, there are various little niceties in the mode of operating, the observance of which is necessary to ensure success. The incision which is carried through the abdominal coverings, may be made in the *linea alba*, and should be eight or ten lines, at least, in length, in order that the parts may be replaced with facility. It should, too, lie as close to the *symphysis pubis* as possible, that the intestines, which in this herbivorous animal are numerous and cumbersome, may not, as they are apt to do when the incision is higher, protrude at the opening. It is true, indeed, that if the incision is placed in the vicinity of the pubes, the bladder, when it is distended, will fall in the way; but if the operator possess the requisite dexterity, there is no danger of wounding it; and a gentle pressure, persevered in for a time, will occasion it to withdraw into the pelvis. It deserves remark, however, that to produce this contraction, a little perseverance is necessary; for the bladder is not, in this manner, so readily excited to contract, as

from previous reasonings on its irritability, we might have been led to expect.

To close the abdominal opening, the Glover's suture will serve as well as any other; nor does the including the peritoneum in the stitches, so far as I have been able to observe, materially increase the risk of a general inflammation. Exemption from this, depends much more upon the habit of the animal, than the niceties of the wound.

And here I may be permitted to remark, in the way of digression, that from various observations* upon brutes, as well as my fellow-creatures, I cannot forbear imagining, that the risk of extensive inflammation, from local injury of the *peritoneum*, has been exaggerated, perhaps greatly. The high importance of this principle in surgery, is too obvious to require a comment; already a sufficient number of observations has been accumulated, to induce us to examine it with attention; and I may add, that it is one of those grand practical points, which ought not to be de-

* Operations for hernia and on the abdominal viscera of rabbits and dogs. The rabbit I suspect is very liable to spontaneous inflammation of the bowels. I have known in women the malignant ulcer of the womb penetrate into the peritoneal cavity, between the *rectum* and the *uterus*, without exciting a general inflammation of the belly.

cided by a few casual facts, much less by authorities, however venerable ; but, like every other principle of a solid philosophy, by various, deliberate, and unbiassed experiment and observation.

If in performing this operation, (as in the first set of experiments,) the womb is divided, the incision should be made transversely near its mouth, in order that we may leave the fallopian piece as large as possible, for the reception of the *ova*, in case the genitals should have power to form them. It ought, too, to be carried from four to six lines into the mesometry, in order that the pieces thus liberated, and moving out of apposition with each other, may not reunite so as to form anew a continuous canal. If, on the contrary, (as in the second scheme of experiments,) the vagina is divided, a ligature should be applied to the orifice of that piece of it which remains annexed to the womb, and fastened to the margin of the external wound. This precaution ensures the escape of the thread*,

* In operating upon the viscera of small animals, I have occasionally used a very slender ligature, have cut it short, and left it. In two rabbits, which had apparently recovered after the vagina had been tied in this manner, a general inflammation of the belly came on about six months afterwards, in the winter, when the health of the animals was impaired by the severity of the season. On inspection after death, it was found, that the ligature still adhered to the vagina, and it seemed to form the centre from which the inflammation had spread.

and at the same time prevents the pieces of the vagina from falling into apposition, and renewing the continuity of the canal.

When the genitals are mature, the rabbit very frequently dies from this operation, which, in consequence of the large size of the vagina, is more violent than the former. It is better, therefore, on this account, as well as for reasons already assigned, to operate before puberty. Previously to this change the parts are comparatively small, and the interruption of the vagina does not, as we might have been led from previous reasonings to expect, prevent the subsequent developement of the sexual organs. But to return from these details.

Although it appears probable, from the preceding experiments, that the complete process of generation requires the access of the semen to the rudiments, it seems equally certain, from a variety of appearances which I noticed in the course of my experiments, that to a certain extent, though imperfectly, it may be accomplished without it. These appearances I shall now proceed to state.

In both the uterine and vaginal experiment, the womb, though it contained no fetuses, in many cases enlarged, as in extra-uterine pregnancy. Its structure too became developed; it received more copious supplies of blood; in short, it frequently

seemed as well prepared as its fellow, for receiving and cherishing the rudiments*.

The ovaries, too, I may further add, although there was no genuine impregnation of them, were very obviously excited. The vesicle in different parts of them germinated; its fluids increased; the delicate covering opened; the little cavity discharged its contents, and corpora lutea formed in all their perfection. As this appearance of the *corpus luteum*, notwithstanding the interception of the semen, is of considerable importance, and may help to clear away an objection to which the experiments lie open, it becomes necessary to examine it with attention.

The corpus luteum in the rabbit, as long as it remains, is, I think, *always* marked by pretty strong characteristics, though its appearance differs considerably with its age. A mammillary projection of the ovary, an augmented vascularity, a minute cavity, which, when the luteum is cut through, recalls to mind the appearance of a printed asterisk (*), constitute the leading characteristics; and by these, I may add, it is so decisively marked, that, although the parts are on a small scale, an experienced eye may detect it at a glance.

* It deserves notice, that, in the uterine experiments, it was generally the fallopian portion of the womb to which the semen was not applied, and not the vaginal to which it was applied, which appeared to undergo these changes in the highest degree.

Colour is of little use in distinguishing these bodies in the rabbit. The younger the *luteum* is, the more prominently the characteristics appear*.

Now, these lutea, thus characterized, were distinctly produced both in the uterine and vaginal experiments. In the uterine experiments I had an opportunity of contrasting those of the fruitful

* In giving the name of *corpus luteum* to the appearance here described, I merely adopt the nomenclature of preceding physiologists; and in stating my belief that this appearance is the result of impregnation, or, at most, of the sexual excitement when exalted to its highest pitch, I am only advancing an opinion, which is, I conceive, *as far as respects the rabbit*, confirmed by observation. I have frequently examined the ovaries of the doe, in the virgin condition, and during heat; and in one or two cases, after the animal had been under the influence of long-continued and lively desire. In the two last instances I have never found the appearances described, though I dare not, from a negative observation of this kind, deny, that, under these circumstances, their formation is possible. In the first case, on the contrary, I have invariably discovered them, and older or younger in their appearance, according as they were examined sooner or later after impregnation. There can, therefore, I apprehend, be little doubt, that these appearances occurring *in the rabbit*, are the result of conception. This fact is sufficient for my reasoning. It may, indeed, seem irreconcilable with the opinion which a veteran physiologist has formed, respecting the nature of the human corpus luteum (see Philosophical Transactions); but so long as it appears to be confirmed by observations, conformably to sound philosophy, it cannot be denied. I am far, however, from wishing rashly to impugn the opinion of Sir Everard Home. Truths once proved must be admitted, and their apparent inconsistency demonstrates our ignorance, not their incompatibility.

and sterile ovary with each other, and yet, after the most deliberate examination, I could not discriminate the slightest difference between them. It deserves notice, also, that in some instances they were more numerous upon the prolific, and in others upon the barren side of the genitals.

In these experiments, it may be further remarked, the fallopian tubes, as well as the ovaries and wombs, seemed to be excited by coition. I observed repeatedly, in those experiments in which the vagina was interrupted, that the abdomen of the doe enlarged in a few days after the sexual commerce; and that enlargement, never noticed before, and gradually decreasing* in a few weeks afterwards, if the male was excluded, might by repeated coitions be carried to a very great degree. There is now in my possession, a doe with an interrupted vagina, which has admitted the male from twenty to thirty times. In this animal, in consequence of these repeated connections, the abdomen has gradually acquired so large a size, that it considerably exceeds the bulk of mature gestation, and reminds one of the tumor of an ascitic which requires the trocar. These enlargements, I have ascertained from repeated dissections, result from the accumulation of a humor in the wombs. This humor, various in its consistency and colour, is, however, generally fluid and pale, and turbid, and always, so far as my experi-

* It did not however subside completely.

ments have extended, forms albuminous concretions at a temperature below boiling heat. Even in the uterine experiments, (for the preceding remarks refer to the vaginal only), the same essential appearances were observed; the wombs, in consequence of impregnation, became filled, on the sound side, with fetuses, and on the barren with the humor described.

These facts are very significant. The formation of the lutea, the developement of the wombs, and above all, the repeated accumulations of fluid there, in consequence of coition, all seem to indicate the descent of the rudimental material; and reflecting upon them, I cannot forbear imagining that the tubes were excited, that they really transferred the rudiments to the womb, and that these rudiments engendered the watery accumulations there, in the abortive attempts of generation. This notion receives some little countenance from the generation of oviparous animals; for in many of the different species referred by naturalists to this class, the rudiments may be discharged independently of preceding impregnation. The common fowl is an example of this; the frog, the toad, and a numerous tribe of fishes. This opinion, however, is merely conjectural, and I must acknowledge candidly that it is the less entitled to confidence, as it rests on a sort of accidental observation, made subordinately, perhaps with some degree of remissness, at a time

when others of greater importance in the inquiry occupied a principal share of my attention. This remark I take the liberty of introducing here, as I conceive it to be the duty of every experimental inquirer *himself* to distinguish between his conjectures and demonstrations, and thus, by the exercise of a philosophical frankness, to prevent error from insinuating itself from its association with truth.

On the whole, then, it seems probable, judging from the appearances related, that generation may be carried forward to a certain extent, although the access of the semen to the rudiments is intercepted. Under these circumstances, the young animal cannot be formed, it is true; but corpora lutea may be generated; the wombs may be developed; and the rudiments, if we may judge from the facts already stated, may even be transferred to the uterine cavity by the play of the fallopian tubes.

It should be remarked, however, in dismissing this part of our subject, that these imperfect attempts at generation do not always equally occur. Corpora lutea, I believe, will be found to form invariably after sexual intercourse, if the genitals are excited at all; but in some anomalous instances, there is no consequent developement of the wombs, and in others, no accumulation of the uterine fluid. The first of these failures has oc-

curred to me once in twelve experiments, and the last of them five times*. But these *negative* irregularities merely prove, that, under circumstances, the genitals may be more extensively excited at one time than another. They by no means invalidate the principle which it has been my endeavour to establish on positive facts, that the ovaries, tubes, and *uterus*, are capable of an imperfect excitement, even when the semen and the rudiments are kept apart from each other.

Against the experiments and reasonings advanced in the preceding pages, various objections may be urged, to which it may now be proper to advert.

And first, it may be objected that sterility is sometimes an accidental occurrence. We frequently observe it in human generation. In the experiments under consideration it would perhaps have occurred, although the interception of the semen, to which it is ascribed, had not taken place. To these objections, however, I would reply, that in the rabbit the accidental failure of impregnation is rare, and does not occur in one doe out of twenty, if the animal is in health; that the appearance of the genitals, and the behaviour of the female when the male was admitted, both of them

* In one or two instances the orifice formed by dividing the uterus remained open in the fallopian piece. This accounts for some of the failures of uterine accumulation.

indicated inclination and aptitude for generation ; that these experiments were not solitary, but frequently repeated ; and that sterility was not an accidental occurrence, in a single instance only, but an invariable result of them all. Nor must it be forgotten that the formation of the *lutea*, and the evolution of the *uterus*, are themselves sufficient proofs that the genitals were not accidentally inactive ; nor that in the uterine experiment, in which the semen was intercepted on one side only, there were undeniable proofs of the generative excitement in the formation of the young animals on the other.

But there is another objection to which the experiments lie open, which on a cursory consideration, at least, may appear to bear with considerable weight. In these operations either the wombs or the vagina were cut asunder. It may be asserted therefore that sterility ensued, not so much in consequence of the interception of the semen, as from the debility induced in the genitals by operative violence ; the germs afterwards perishing because the soil was become unfriendly.

To this plausible objection, however, it might be sufficient to reply, that from the form of the parts the injury of the operation is merely local ; that when the vagina is cut through, before puberty, the genitals suffer so little from it that they

are afterwards brought to maturity in the same manner as if no operation had been performed ; and that in both sets of experiments, whether uterine or vaginal, the wombs frequently become enlarged and developed, and like a fruitful and well dressed soil (to resume the figure already adopted), are brought into high condition for raising the rudiments to perfection. To obviate this objection, however, in a still more satisfactory manner, the following experiments were instituted.

I divided the vagina of two young does, just before their puberty ; but instead of securing the uterine piece to the verge of the abdominal wound, I allowed it to remain in apposition with the other. In consequence of this method of operating the parts reunited ; the canal of the vagina was renewed ; and the sexual desires appearing a few weeks after recovery, both the rabbits became impregnated. The inference is obvious.

The second set of experiments, turning on the same principle, was executed on the wombs themselves. In these both the wombs were divided, the one in two, and the other in three places, in such a manner, however, that the incision was not carried completely across into the mesometry ; so that the pieces were retained in mutual apposition, and reunited without interruption to the uterine canal.

The result of these experiments was decisive. From the very method of operating it is obvious the wombs were more roughly handled in this than in any of the preceding experiments; accordingly a larger number of the rabbits died; and yet, notwithstanding this violence, the very first doe which recovered produced no less than nine fetuses from her *first* intercourse with the male. Indeed so complete was the action of the *uterus*, that there was not one of the little masses of rudimental matter which it failed to mature; and it was found, on a careful comparison of the wombs with the ovaries, that the number of fetuses and corpora lutea was the same. To these remarks I may add, that the human womb, although it has been cut or torn, or partially destroyed by ulceration, still retains the power of maturing the rudiments. Healthy children have been born, not only after recoveries from uterine rupture and the Cæsarian operation, but even at the time when the neck of the womb had been ulcerated. A case of this kind has lately fallen under my own knowledge; and others are recorded by obstetric writers.

There yet remains a third objection, which, it is conceived, may be completely obviated, though at first view it wears a very formidable aspect. The vagina of the rabbit is very long and very large; its course is not direct; the organ of the male can neither fill it nor penetrate to the orifices of the wombs;

how then can the semen be injected into the uterine cavity, even granting that it might meet the rudiments there?

This objection, felt in all its force by those who have examined the genitals merely in the preparation glass, falls at once when they are viewed in the rabbit while it is living; or, to avoid unnecessary severity, immediately after the dealer has killed it.

Both the vagina and the wombs perform a peristaltic action, the wombs somewhat obscurely, the vagina in a more lively manner, even than the intestines of the animal themselves. This canal indeed, during the heat, is never at rest; it shortens, it lengthens, it changes continually in its circular dimensions; and, when irritated especially, will sometimes contract to one third of its quiescent diameter. Now this peristaltic action, resembling the intestinal, is itself sufficient to explain the transmission of the semen*. In addition to this action, however, the vagina performs another, easily comprehended on inspection, although, as frequently happens, the verbal description of it may perhaps appear a little obscure. The action to which I here allude, consists in the falling down, as it were, of that part

* There is some little reason for surmising that even the human vagina can perform a sort of peristaltic movement. Two facts have been related to me which lead to this opinion, but they are of a character too delicate for public exposure.

of the vagina which lies in the vicinity of the wombs ; so that it every now and then lays itself as flatly over their orifices as we should apply the hand over the mouth, in our endeavours to stop it. So close is this application, that I have sometimes fancied I could perceive externally something resembling a little dimple, occasioned by the sinking of the surface of the vagina into the orifice of the womb. How well adapted the whole of this curious movement is for the introduction of the semen at the opening, it is needless to explain. The mere performance of it furnishes no contemptible argument in proof of that approach of the semen to the rudiments for which I have been contending.

Before I close these observations (already perhaps too diffuse) I cannot forbear adverting to some other points of the genital physiology, which they may contribute to illustrate.

It has been asserted by some naturalists, that the corpus luteum is an evidence of genuine impregnation. It seems *certain*, however, from the facts related, that this evidence cannot be relied on ; for the luteum, in these experiments, was generated under circumstances in which, as the event proved, impregnation was impossible. Indeed there seems to be little reason for doubting, that the corpus luteum may be produced, even independently of the sexual intercourse, by the

mere excitement of desire in a very high degree. Mr. Saumarez has recounted experiments, in his "New System of Physiology," in which the *luteum* appears to have been generated in this very manner. I have now in my possession a preparation, (for which I stand indebted to Dr. Cholmeley and Mr. Callaway) consisting of the ovaries of a young girl, that died of chorea, under seventeen years of age, with the hymen, which nearly closed the entrance of the vagina, unbroken. In these ovaries, the corpora lutea are no fewer than four. Two of them, it must be acknowledged, are a little obscure; though an experienced eye, I conceive, would readily detect them. The remaining two are very distinct, and differ from the corpus luteum of genuine impregnation, merely from their more diminutive size, and the less extensive vascularity of the contiguous parts of the ovary. In every other respect, in colour and form, and the cavity which they contain, their appearance is perfectly natural, indeed so much so, that I occasionally circulate them in the class-room, as accurate specimens of the luteum upon the small scale.

On this point I have been the more explicit, both as the principle is of some importance in forensic medicine, and as it removes at once an objection to which these experiments lie exposed, and which is taken from those of Dr. Haigh-ton. In these experiments, very ingenious, and

extremely beautiful, my valued relative has shewn, with his usual accuracy, that the corpus luteum may form though the fallopian tube has been obliterated in some part of its course, and the access of the semen to the rudiments therefore has been intercepted. When, however, he infers from this, in opposition to the principle asserted in this memoir, that the ovary has been impregnated, notwithstanding the interception of the semen, he certainly falls into one of those errors, from which the most wary physiologist is never absolutely exempt, for the corpus luteum is not a certain evidence of impregnation.

The appearances related, I may further remark, afford, when combined with others, a plausible proof that the semen sometimes penetrates as far as the ovaries ; a point which has been much controverted.

In the varieties of human generation, we sometimes meet with extra-uterine pregnancies, in which the ovum not only lodges in the tubes, or the peritoneal cavity, but in the ovary itself. Indeed, this form of the disease seems on the whole the most common. Now, if it be true, as I have endeavoured to prove, that the young animal cannot be formed unless the semen have access to the rudiments, it is evident, that in these pregnancies, in which the fetus is generated among the graafian vesicles, the semen must have made its way up to

the ovaries themselves. It must not, however, be too hastily inferred from this, that the semen always penetrates into these remote recesses of the genitals. Facts have been related, which give a shade of probability to the conjecture, that without the contact of the semen the rudiments may sometimes descend into the uterus; and certainly, although the opinion is not without its difficulties, it is not impossible that they may meet each other there*.

There is yet a third point in the physiology of generation, which the preceding experiments may contribute to elucidate. It has been contended by some naturalists, and not without show of reason, that the semen in generation is transferred to the blood-vessels; and as the purgative or emetic, when injected into the veins, exert their peculiar influences on the stomach or the bowels, so also, in their opinion, this active fluid, transmitted by the absorbents, makes its first impression on the vascular surface, and its second, by a similar sympathy, on the genitals themselves. What effects might be produced by injecting the semen directly into the veins when the genitals are in a state of excitement, I shall not venture to determine; as yet I am in possession of no decisive experiments upon the point, and it would be a mere waste of

* Is the transfer of the semen beyond the womb the cause of extra-uterine pregnancy?

mind to speculate without them. It seems evident, however, from the facts related, that after transmission through the absorbents and their glands, the semen retains no such generative influence. It will be readily conceded, that when a rabbit admits a large male, in vigorous health, and in the flower of its age, as many as twenty or thirty times, a large quantity of the genital fluid must be imbibed by the absorbents of the vagina, yet neither in the uterine nor the vaginal experiment, in which these repeated coitions sometimes took place, was impregnation by absorption accomplished. The simple exclusion of the semen from the rudiments always prevented the formation of the young animal; in the vaginal experiments it was not produced at all; in the uterine it was formed on that side only where the womb remained pervious.

On a review of the whole inquiry, it will, I conceive, appear not improbable that, for the completion of generation, the semen must have access to the rudiments; and yet that notwithstanding the necessity of these approaches, for its completion, the process to a certain extent may be accomplished without them. These are the two leading propositions which it has been my endeavour to establish; at the same time I have subordinatedly attempted further to shew, that the corpus luteum is not a proof of genuine impregnation; that the semen, at least occasionally, penetrates

as far as the ovaries ; and that however copiously this fluid may be absorbed into the vessels, it is incapable of giving rise, by any impression there, to the complete circle of the generative actions.

Whether these principles of brute generation may be transferred to our own, I will not venture to determine. Analogical arguments, generally the best that physiology furnishes, are, it must be admitted, never absolutely demonstrative ; but as the generation of the rabbit, in its other principles, resembles that of the human female, there seems to me but little reason for supposing that there is an essential difference here.

*St. Saviour's, Southwark,
June 1st, 1818.*

THE END.